

Customised Solutions

Welcome to the Grundfos world of customised solutions



Grundfos CR and NKG/NKG

The basic CR and NKG/NKG pump ranges, which apply to almost any industrial solution, constitute the broadest range available. With our modular approach, we have made them even broader.

The basics

The basic CR pump range is available in four different materials – including cast iron, two grades of stainless steel, and all-titanium versions – in eleven flow sizes, capable of producing almost 50 bars of pressure, and with a variety of shaft seals, rubbers, and supply voltages.

The basic NKG/NKG pump range is available in three different materials – including cast iron and two grades of stainless steel – with a flow range up to 1200 m³/h, pressure ratings of 10, 16 or 25 bar, and with a variety of shaft seals, rubbers, and supply voltages.

In order to make the CR and NKG/NKG pumps suitable for even more industrial applications, we have redesigned some of the vital but, normally, standard pump parts to enable them to handle difficult liquids or stand up to particularly demanding operating conditions.

This means that we do not need to create a completely new pump model to deal with such applications – the modular concept of the CR and NKG/NKG pump ranges makes it possible to put together a specialised pump for any particular application by selecting the modules best suited for the job from the existing, comprehensive range of module variants.

The modular approach

At Grundfos, we look at the CR and NKG/NKG pump ranges as a building system consisting of four interrelated modules:

- CR range:**
- Motors** - page 12-13
- Shaft seals** - page 14-15
- Pump modules** - page 16-17
- Other options** - page 18-19

- NKG/NKG range:**
- Motors** - page 24-25
- Shaft seals** - page 26-27
- Pump modules** - page 28-29
- Other options** - page 30-31

All modules described are tested, qualified, documented and proven, just like any standard Grundfos pump. You can mix and match to suit almost any pump requirement to handle aggressive, abrasive, toxic, explosive, hardening, crystallising or otherwise difficult liquids.

If your installation has special specifications such as limited space, earthquake risk, high altitude, certification requirements or you simply want the pump in your company colours – it is all at hand with the CR and NKG/NKG pump ranges.

Adding up all pump variants available, we have passed several millions – and counting!

High pressure applications

High pressure pumps are subject to demanding operating conditions. High pressure causes increased wear on pump parts and thus reduces pump life. To avoid unexpected downtime, we provide special pump and shaft seal design, bearings, etc.

CR range

- Filtration
- Reverse osmosis
- Steam boiler feed
- Washing and cleaning
- Industrial processes



Situation	Consequence	Solution	See page
High inlet pressure	Motor bearings overloaded	Use bearing flanges to eliminate forces on motor bearings	17
High system pressure	Reduced life of shaft seal	Use special CRN high pressure or CRN high speed	17
	Pump breakage	Use reinforced pump design to handle up to 50 bar	17
High pump pressure	Too many stages to reach desired pressure, i.e. pump too tall	Use special CRN high pressure or CRN high speed	17
Limited space for installation	Pump is too high and may not fit into installation area	MGE high-speed motor solution or horizontal design and bracket mounting	12 16
Varying frequencies and voltages around the world	Need for different frequencies and voltages	Choose among our wide range of motors with different frequencies and voltages	12

NBG/NKG range

- Filtration
- Membrane filtration/Feed pump
- Pressure boosting
- Washing and cleaning
- Industrial processes

Situation	Consequence	Solution	See page
High inlet pressure	NBG - motor bearings overloaded	Use NKG with heavy-duty bearing bracket	29
	NKG - bearings in bearing bracket overloaded		
High system pressure	Pump failure	Use stainless steel pump design to handle up to 25 bar	29
Unstable curve	The pump can make 'hunting'	Use NBGE or NKGE speed controlled pump with special software	24
Varying frequencies and voltages around the world	Need for different frequencies and voltages	Choose among our wide range of motors with different frequencies and voltages	25

Hot liquid applications

Hot water exposes pumps to operating conditions, which may lead to cavitation and/or cause wear on pump parts and thus reduce pump life. To avoid unexpected downtime, we provide solutions for steady steam production, poor inlet conditions, hot temperatures, etc.

CR range

- Steam boiler feed
- Washing and cleaning
- Mineral oils
- Industrial processes
- Chemical industries

Situation	Consequence	Solution	See page
Poor inlet conditions	Risk of cavitation	Use low NPSH pump to reduce NPSH curve	16
High temperature	Shaft seal destroyed	Special Grundfos shaft seal designed to handle hot liquids up to 180°C	15
Fluctuating steam demand	Pump performance must adapt	CRE speed controlled pumps	12
Limited space for installation	Pump is too high and may not fit into installation area	MGE high-speed motor solution or horizontal design and bracket mounting	12 16
Varying frequencies and voltages around the world	Need for different frequencies and voltages	Choose among our wide range of motors with different frequencies and voltages	12

NBG/NKG range

- Hot water boiler
- District heating
- Washing and cleaning
- Mineral oils
- Industrial processes
- Chemical industries

Situation	Consequence	Solution	See page
High temperature	Shaft seal destroyed	Special Grundfos shaft seal designed to handle hot liquids up to 160°C	26 27
	Bearing life reduced	Monitoring of bearing temperatures	29
Fluctuating steam demand	Pump performance must adapt	Use NBGE/NKGE speed controlled pumps	24
Thermal oils	Shaft seal and rubbers destroyed	Special shaft seal designed to handle oil up to 220°C	26 27
Varying frequencies and voltages around the world	Need for different frequencies and voltages	Choose among our wide range of motors with different frequencies and voltages	25



Difficult liquid applications

When pumping dangerous and aggressive liquids, safety is all important. We provide solutions for aggressive and abrasive liquids, hazardous and hardening liquids as well as flammable liquids.

CR range

- Chemical industries
- Pharmaceutical industries
- Petrochemical industries
- Refineries
- Distilling plants
- Paint industries
- Mining



Situation	Consequence	Solution	See page
Abrasive liquids	Excessive wear of shaft seal faces	Use double shaft seal	14
Toxic liquids	Contamination of environment or people	Use MAGdrive or double shaft seal	14 15
Flammable liquids	Risk of explosion or fire	ATEX approved motor and pump for explosive environments	12
Crystallising liquids	Leakage due to crystallisation between shaft seal faces	Double shaft seal (tandem or back-to-back)	14
Aggressive liquids	Corroded pump metal parts or swollen rubber	Special material e.g. titanium and resistant rubber	14 15

NBG/NKG range

- Chemical industries
- Petrochemical industries
- Refineries
- Distilling plants
- Paint industries
- Mining

Situation	Consequence	Solution	See page
Abrasive liquids	Excessive wear of shaft seal faces	Use double shaft seal (tandem or back-to-back)	26
Toxic liquids	Contamination of environment or people		
Crystallising liquids	Leakage due to crystallisation between shaft seal faces		
Sticky liquids	Damage of shaft seal torque transmission system		
Vacuum operation	Air ingress in pump system		
Flammable liquids	Risk of explosion or fire	ATEX approved motor and pump for explosive environments	24
Aggressive liquids	Corroded pump metal parts or swollen rubber	Use stainless steel pumps, resistant rubber and double shaft seal solution	26 27

Temperature control

Pumps used in applications involving temperature control are exposed to very low or very high temperatures as well as fluctuations. This extreme exposure stresses the materials due to thermal expansion or contraction.

CR range

Cooling systems for:

- Electronic data processing
- Laser equipment
- Medical equipment
- Industrial cooling and freezing processes

Temperature control systems for:

- Casting and moulding tools
- Oil processing
- Chemical processes

Situation	Consequence	Solution	See page
Secondary refrigerants	Standard pumps cannot handle very low temperatures	Special pump capable of handling liquids down to -40°C	16
Thermal oils	Very high temperatures	Special shaft seal designed to handle oil up to 240°C	15
Viscous or dense liquids	High viscosity or liquid density causes motor overload	Oversize motor	13
Temperature control	Adapt pump performance	CRE, speed controlled pumps	12
Explosive environment	Risk of explosion or fire	ATEX approved motor and pump	12
Limited space for installation	Pump is too high and may not fit into installation area	MGE high-speed motor solution or horizontal design and bracket mounting	12 16
Varying frequencies and voltages around the world	Need for different frequencies and voltages	Choose among our wide range of motors with different frequencies and voltages	12

NBG/NKG range

Cooling systems for:

- Electronic data processing
- Laser equipment
- Medical equipment
- Industrial cooling and freezing processes

Temperature control systems for:

- Casting and moulding tools
- Oil processing
- Chemical processes

Situation	Consequence	Solution	See page
Secondary refrigerants	Standard pumps cannot handle very low temperatures	Special pump capable of handling liquids down to -25°C	28 29
Thermal oils	Shaft seal and rubbers destroyed	Special shaft seal designed to handle oil up to 220°C	26 27
Viscous or dense liquids	High viscosity or liquid density causes motor overload	Oversize motor	25
Temperature control	Pump performance must adapt	Use NBGE/NKGE speed controlled pumps	24
Explosive environment	Risk of explosion or fire	ATEX approved motor and pump	24
Varying frequencies and voltages around the world	Need for different frequencies and voltages	Choose among our wide range of motors with different frequencies and voltages	25

Hygienic applications

Pumps used in industries, where a hygienic production is crucial, have to comply with strict requirements as to design, materials, surface quality, and cleanability. To ensure safe production, we provide solutions for applications with special requirements to design and cleanability in secondary hygienic processes.

CR range

- Pharmaceutical industries
- Biotechnological industries
- Food and beverage
- Chemical processes

Situation	Consequence	Solution	See page
Bacteria growth	Surface roughness < 0.8 microns	Electropolished pump	19
	Drainable base	Standard feature	-
Hygienic connections	Avoid microbial growth Standard connections cannot be used	TriClamp connection	19

Special installation requirements

Certain types of installations require a different pump design than the traditional vertical pump. We provide solutions for applications involving horizontally mounted pumps, belt-driven pumps, ejector pumps, etc.

CR range

- Ships
- Mobile applications
- Fire fighting
- Earthquake prone areas
- Remote areas
- Deep-well pumping
- Limited space for installation

Situation	Consequence	Solution	See page
Marine insurance required	Inspection certificates required	Lloyds (LRS),Veritas (DNV), American (ABS), etc.	19
Installation on ships or other vehicles	Pump stressed due to vibrations	Horizontal installation	16
No electricity available	Pump must be powered by non-electrical source	Pump with belt drive e.g. for diesel engines	17
Special colour required	E.g. fire fighting pumps or pumps in company colours	Customised solution offered	19
Limited space for installation	Pump is too high and may not fit into installation area	MGE high-speed motor solution or horizontal design and bracket mounting	12 16
Pump certification required	Pump must be classified according to international classification societies	Various certificates available	19

NBG/NKG range

- Ships
- Mobile applications
- Fire fighting
- Earthquake prone areas
- Remote areas

Situation	Consequence	Solution	See page
Marine insurance required	Inspection certificates required	Lloyds (LRS),Veritas (DNV), American (ABS), etc.	31
Vibration sensitive application	Pump vibrations can be transmitted to the installation	Grouting of the base frame is an option	30
No electricity available	Pump must be powered by non-electrical source	Bare shaft pump driven by a diesel engine	29
High humidity	Condensation in terminal box	Use NBGE, NKGE speed controlled pumps with anti-condensation heater function	24
Special colour required	E.g. fire fighting pumps or pumps in company colours	Customised solution offered	31
Pump certification required	Pump must be classified according to international classification societies	Various certificates available	31



CR PUMPS

Available in more than
1 million different
configurations



Motors



Grundfos Blueflux® technology represents the best from Grundfos within energy efficient motors and variable frequency drives.

Products with Grundfos Blueflux® label either meet or exceed international legislation regarding motor efficiency.

Grundfos Blueflux® labelled motors are standard in CR pumps with motor size 0.75-75 kW and motors with integrated frequency converter from 0.75-22 kW.

What follows is an overview of some of the most common motor variants offered by Grundfos. However, the overview covers only a fragment of the total motor range. Please do not hesitate to contact Grundfos if your requirements are not covered by the overview.

- Special supply voltages
- Extreme operating conditions
- Special motor protection
- Specific approval
- Special motor design



Solution	Description	Photo
ATEX approved	A full range of special explosion-proof and dust ignition-proof motors is available with ATEX approved pumps.	
MGE motors	The Grundfos MGE motor with integrated frequency converter can operate at different speeds in order to optimise pump performance to the application: Low speed, to obtain e.g. - gentle handling of the liquid - pumping at low NPSH level - reduced noise emission Oversynchronous speed, to obtain e.g. - more flow and head on a given pump size - compact physical size The advanced control can measure and adapt to special applications, e.g. - Extended protection of process - Extended protection of pump and drive - Pump performance curve adjusted to match individual applications Standard MGE motors have built-in motor protection, pump monitoring, and on-board regulator and sensor supply for control of primary process. If special control is required, the MGE can be equipped with extended I/O cards and BUS connection. Customised software and add-on hardware can be tailored to match special demands. The MGE motor can be controlled by a variety of interfaces, i.e. - buttons on the pump - advanced R100 infra-red remote control - standard analogue signals - BUS communication	
Heating units	Anti-condensation heating can be supplied by a built-in heating unit.	
Multi-plug	Our motors are available with a multi-plug (Harting® plug) according to HAN 10 ES for fast mains connections.	
Thermal protection	Motors with a built-in bimetallic thermal protector (PTO) or a temperature depending resistance (PTC) are available.	

Solution	Description	Photo
cURus approval	Grundfos motors are available with the cURus approval covering USA and Canada. Dual frequency: 50 Hz: 3 x 208-230/460 V 60 Hz: 3 x 400 V	
Certificates	The Grundfos laboratory is authorised to issue various certificates for motors: - noise - vibration - performance - efficiency	
Four-pole motor	Four-pole motors for applications where very low noise levels are required or for applications that do not allow whipping of the pumped liquid.	
VIK approved motors	VIK approved motors are available according to German industrial electrical standard.	
Over or undersize motors	For use where the viscosity or density is different from that of water, installations where the altitude exceeds 1000m or where the ambient temperature is very high.	
Terminal box position	The motor can be mounted on the pump head in steps of 90°.	
Special voltage	A wide range of supply voltages within single three-phase as well as dual voltage can be supplied.	
Enclosure class	Enclosure class IP 55 is standard on Grundfos motors. Enclosure class IP 65, IP 54 and IP 44 are available as options.	



Shaft seals

Extreme liquids call for extreme measures. Most pumps are used for watery liquids at temperatures below 120°C and pressures lower than 30 bar. When liquids go beyond these limits, special shaft seal solutions are required to guarantee reliable operation.

What follows is an overview of some of the most common shaft seal variants for the CR range offered by Grundfos. However, the overview covers only a fragment of the total shaft seal range. Please do not hesitate to contact Grundfos if your requirements are not covered by the overview.

- Aggressive or corrosive liquids
- Abrasive liquids
- Poisonous and/or explosive liquids
- High-viscosity and/or sticky liquids
- Extraordinary high pressure
- Extraordinary high or low temperature



Solution	Description	Photo
Double shaft seal Back-to-back	For applications involving dangerous, flammable, or very abrasive liquids, a double shaft seal, back-to-back, fitted in a pressure chamber is available. The pressure in the chamber must be higher than the pump pressure to prevent leakage. The barrier fluid pressure can be supplied by either a Grundfos dosing pump arrangement (up to 16 bar) or an intensifier for pressure requirements above 16 bar.	
Double shaft seal Tandem	For applications involving a high risk of crystallisation (e.g. sugar solutions) or hardening (e.g. oil or paint) as well as pumps handling vacuum, a special double shaft seal in a tandem arrangement is available. Grundfos offers a quenching fluid system for the flushing of the shaft seal.	
Titanium shaft seal	For applications involving a high risk of corrosion, an all-titanium shaft seal variant is available for the all-titanium CRT pumps.	
LiqTec™ dry running protection	The Grundfos LiqTec™ is an electronic anti-dry-running sensor that stops the pump immediately if it senses no liquid. The LiqTec™ can also monitor the flow and temperature of the pumped liquid and can operate as a PTC relay for the motor monitoring motor overload.	

Solution	Description	Photo
MAGdrive (sealless)	MAGdrive pumps are completely leak-free. They use the power of strong magnets to turn the pump shaft from outside, so there are no seals or openings for the liquid to escape through. The result is safe, hermetically closed pumping.	
Shaft seal variants	Grundfos offers a wide range of balanced cartridge shaft seals with different seal faces such as Silicon Carbide, Carbon and Tungsten Carbide to handle almost any industrial liquid.	
Rubber materials	Seals fitted with chemical resistant FXM (Fluoraz™) or FFKM (Kalrez™) rubber O-rings are available for applications where the liquid may damage standard O-ring materials such as EPDM, FKM and Viton®.	
High temperatures	Pumps which handle high temperatures are fitted with a special air-cooled shaft seal chamber enabling them to withstand water temperatures of up to 180°C (thermal oil of up to 240°C). No external cooling is required.	



Pump modules

All the made-to-stock CR pump modules can handle the most demanding of liquids and pressures – and be adjustable to virtually any requirement. Of course, the modules can be combined in multiple ways making it possible for us to provide you with a pump solution that matches your specific needs. CR pumps come in many flow sizes and various grades of corrosion-resistant stainless steel – and an all-titanium variant.

What follows is an overview of some of the most common CR pump variants offered by Grundfos. However, the overview covers only a fragment of the total pump range. Please do not hesitate to contact Grundfos if your requirements are not covered by the overview.

- High inlet pressure
- High-pressure pump systems required (up to 50 bar)
- Pumping of gas or particle-entrained liquids
- Pumping of high-viscosity or sticky liquids
- Low NPSH level
- Horizontal pump mounting
- No carbon or silicone allowed
- Special materials required



Solution	Description	Photo
Low NPSH pump	For applications involving poor inlet conditions, e.g. boiler feed, special low NPSH versions are available to reduce NPSH and eliminate cavitation.	
Deep-well	For applications involving pumping from deep boreholes (down to 90 metres, a special deep-well CR pump with an ejector for above-ground installation is available).	
All stainless steel	For applications exposed to corrosive atmosphere, e.g. maritime applications or where frequent wash-down occurs, a stainless steel base plate and motor stool are available. All parts exposed to the corrosive installation environment is thus made of stainless steel.	
Horizontal mounting	Certain situations require the pumps to be mounted horizontally. The CR pumps can be designed to fit installations with limited height, vehicles, ships or earthquake prone areas. End-suction base can be supplied as option.	
Refrigerant pump	For applications handling temperatures down to -40°C, special coolant pumps are available. Because of different thermal coefficient of expansion, special design is required.	
Carbon-free solution	For processes that require carbon-free installations, e.g. electronics industry.	

Solution	Description	Photo
Silicon-free solution	For processes that require no silicon, e.g. paint industry, 100% silicon-free solutions are available.	
Rubber materials	Pumps fitted with chemical resistant FXM (Fluoraz®) or FFKM (Kalrez®) rubber O-rings are available for applications, where the liquid may damage standard O-ring materials such as EPDM, FKM and Viton®.	
Pump bearings	A wide variety of bearing materials are available to suit any application, e.g. silicon carbide, bronze, tungsten carbide, and carbon-filled PTFE.	
Bearing flange	For applications with extremely high inlet pressures, a special flange is necessary to counterhold the shaft. It also allows mounting of standard IEC34 or NEMA motors.	
High pressure pumps	For high pressure applications, special single or double pump solutions are available. These pumps are capable of generating up to nearly 50 bar pressure. To avoid high pressure near the vulnerable shaft seal, the hydraulic design of high pressure pumps ensures that the highest pressure is generated at the base of the pump, farthest away from the shaft seal.	
Belt-drive	For applications in remote areas or mobile applications, where electric power is not available, belt-driven pumps powered by e.g. a diesel engine or a steam turbine, can be supplied.	



Other options

In addition to the range of variants relating to the motor, shaft seal, or pump module of the CR products presented on the foregoing pages, Grundfos offers a variety of other customised solutions to suit almost any conceivable need or requirement that you may have. For instance a variety of connection options are available, as are pump models for additional corrosion requirements, hygienic demands or pumps in special colours.

The following overview presents only a fraction of the many possibilities that we offer. Please do not hesitate to contact Grundfos if your requirements are not covered by the overview.

What you need. Guaranteed.

It is more than likely that we will be able to create exactly the right pump for you by combining the elements and options already available within the CR range. But if you have special requirements or a specific design in mind, let us know. We will do our best to provide full satisfaction.

Great tools are just a mouse-click away!

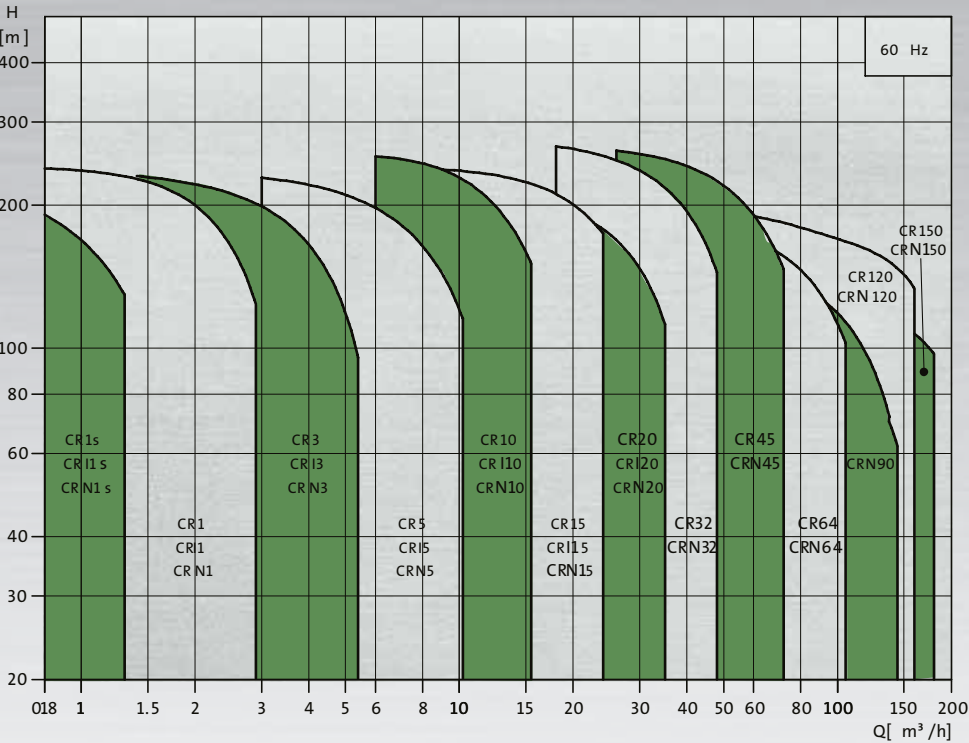
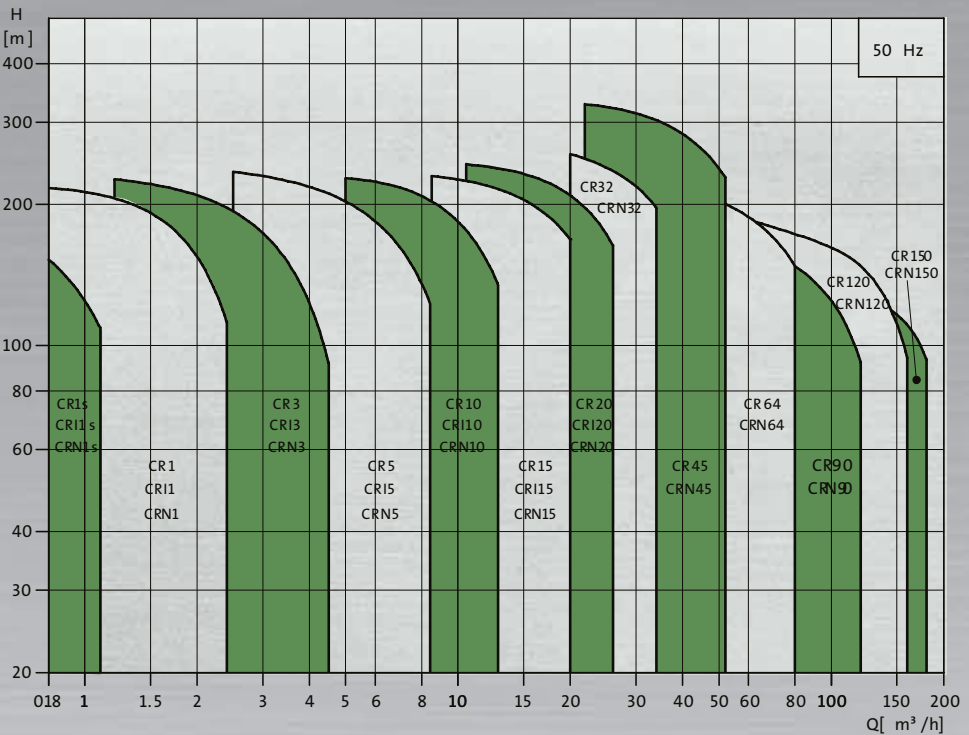
Grundfos offers the market's most comprehensive, 24-hour, online access to everything you need to maintain or service your system: from CAD drawings to installation videos and operating instructions. Go to www.grundfos.com, choose the WebCAPS symbol, and you are there: detailed technical information, drawings, wiring diagrams, dimensioning – everything!



Solution	Description	Photo
Hygienic	For applications in the pharmaceutical and biotechnology industry, special hygiene solutions are available, e.g. electropolished pumps with TriClamp connections.	
Additional corrosion resistance	For applications with a need for improved corrosion resistance, electropolished stainless steel or all-titanium pumps are available.	
Cleaned and dried pump components	For applications with very strict requirements to cleanliness. All pump parts have been cleaned in hot soap water, rinsed in de-ionised water and packed in silicon-free plastic bags.	
Special colours	Pumps are available in a multitude of colours to match any requirement.	
Certificates	A wide range of pump and material certificates are available, e.g. inspection certificates (Lloyds (LRS), Veritas (DNV), American (ABS), etc.), material specification, duty-point verification, surface roughness, vibration test, motor test, ATEX and much more.	
Multi packaging	Pumps can be delivered on pallets without any additional packaging (cardboard).	



Performance curves and technical data



	CR 1s	CR 1	CR 3	CR 5	CR 10	CR 15	CR 20	CR 32	CR 45	CR 64	CR 90	CR 120	CR 150
Range:													
Temperature range (°C)	-20 to +120							-30 to +120					
On request (°C)	-40 to +180							-40 to +180					
Max. pump efficiency (%)	35	48	58	66	70	72	73	78	79	80	81	75	72
Flow range (m³/h)	0.3-1.1	0.7-2.4	1.2-4.5	2.5-8.5	5-13	9-24	11-29	15-40	22-58	30-85	45-120	60-160	75-180
Version:													
CR (AISI 304/Cast iron)	x	x	x	x	x	x	x	x	x	x	x	x	x
CRI (AISI 304)	x	x	x	x	x	x	x						
CRN (AISI 316)	x	x	x	x	x	x	x	x	x	x	x	x	x
CRT (Titanium)			x*	x*	x*	x*							
CR pipe connection:													
Oval flange (BSP)	Rp 1	Rp 1	Rp 1	Rp 1¼	Rp 1½	Rp 2	Rp 2½						
On request (BSP)	Rp 1¼	Rp 1¼	Rp 1¼	Rp 1	Rp 1¼ Rp 2	Rp 2½	Rp 2						
Flange	DN 25/ DN 32	DN 25/ DN 32	DN 25/ DN 32	DN 25/ DN 32	DN 40	DN 50	DN 50	DN 65	DN 80	DN 100	DN 100	DN 125	DN 125
On request					DN 50	DN 65	DN 65	DN 80	DN 100	DN 125	DN 125	DN 150	DN 150
CRI pipe connection:													
Oval flange (BSP)	Rp 1	Rp 1	Rp 1¼	Rp 1¼	Rp 1½	Rp 2	Rp 2						
On request (BSP)	Rp 1¼	Rp 1¼	Rp 1	Rp 1	Rp 2								
Flange	DN 25/ DN 32	DN 25/ DN 32	DN 25/ DN 32	DN 25/ DN 32	DN 40	DN 50	DN 50						
On request					DN 50	DN 65	DN 65						
PJE coupling (Victaulic)	Rp 1¼ DN 32	Rp 1¼ DN 32	Rp 1¼ DN 32	Rp 1¼ DN 32	Rp 2 DN 50	Rp 2 DN 50	Rp 2 DN 50						
Clamp coupling (L-coupling)	Ø48.3	Ø48.3	Ø48.3	Ø48.3	Ø60.3	Ø60.3	Ø60.3						
Union (+GF+)	Rp 2	Rp 2	Rp 2	Rp 2	Rp 2½	Rp 2½	Rp 2½						
CRN pipe connections:													
Flange	DN 25/ DN 32	DN 25/ DN 32	DN 25/ DN 32	DN 25/ DN 32	DN 40	DN 50	DN 50	DN 65	DN 80	DN 100	DN 100	DN 125	DN 125
On request					DN 50	DN 65	DN 65	DN 80	DN 100	DN 125	DN 125	DN 150	DN 150
PJE coupling (Victaulic)	Rp 1¼ DN 32	Rp 1¼ DN 32	Rp 1¼ DN 32	Rp 1¼ DN 32	Rp 2 DN 50	Rp 2 DN 50	Rp 2 DN 50	Rp 3	Rp 4	Rp 4	Rp 5	Rp 5	Rp 5
Clamp coupling	x	x	x	x	x	x	x						
Union (+GF+)	x	x	x	x	x	x	x						
CRT pipe connections:													
PJE coupling (Victaulic)		x*	x*	x*	x*	x*							
Flange (on request)		x*	x*	x*	x*	x*							

*CRT 2,4,8 and 16.





NBG/NKG PUMPS

Mix and match to create the
ideal pump for the job at hand

Motors



Grundfos Blueflux® technology represents the best from Grundfos within energy efficient motors and variable frequency drives.

Products with Grundfos Blueflux® label either meet or exceed international legislation regarding motor efficiency.

The motors are available in a variety of configurations to meet the demands of the pumping environment and/or the pumped liquid itself.

What follows is an overview of some of the most common motor variants offered by Grundfos. However, the overview covers only a fragment of the total motor range. Please do not hesitate to contact Grundfos if your requirements are not covered by the overview.

- Special supply voltages
- Extreme operating conditions
- Special motor protection
- Specific approval
- Special motor design



Solution	Description	Photo
ATEX approved	A full range of special explosion-proof and dust ignition-proof motors is available with ATEX approved pumps.	
MGE motors	The Grundfos MGE motor with integrated frequency converter can operate at different speeds in order to optimise pump performance to the application: Low speed, to obtain e.g. - gentle handling of the liquid - pumping at low NPSH level - reduced noise emission Oversynchronous speed, to obtain e.g. - more flow and head on a given pump size - compact physical size The advanced control can measure and adapt to special applications, e.g.: - Extended protection of process - Extended protection of pump and drive - Pump performance curve adjusted to match individual applications Standard MGE motors have built-in motor protection, pump monitoring, and on-board regulator and sensor supply for control of primary process. If special control is required, the MGE can be equipped with extended I/O cards and BUS connection. Customised software and add-on hardware can be tailored to match special demands. The MGE motor can be controlled by a variety of interfaces, i.e. - buttons on the pump - advanced R100 infra-red remote control - standard analogue signals - BUS communication	
Heating units	Anti-condensation heating can be supplied by a built-in heating unit.	
Multi-plug	Our motors are available with a multi-plug (Harting® plug) according to HAN 10 ES for fast mains connections.	
Thermal protection	Motors with a built-in bimetallic thermal protector (PTO) or a temperature depending resistance (PTC) are available.	

Solution	Description	Photo
cURus approval	Grundfos motors are available with the cURus approval covering USA and Canada. Dual frequency: 50 Hz: 3 x 208-230/460 V 60 Hz: 3 x 400 V	
Certificates	The Grundfos laboratory is authorised to issue various certificates for motors: - noise - vibration - performance - efficiency	
VIK approved motors	VIK approved motors are available according to German industrial electrical standard.	
Over or undersize motors	For use where the viscosity or density is different from that of water, installations where the altitude exceeds 1000m or where the ambient temperature is very high.	
Special voltage	A wide range of supply voltages within three-phase as well as dual voltage can be supplied.	
Enclosure class	Enclosure class IP 55 is standard on Grundfos motors. Enclosure class IP 65, IP 54 and IP 44 are available as options.	

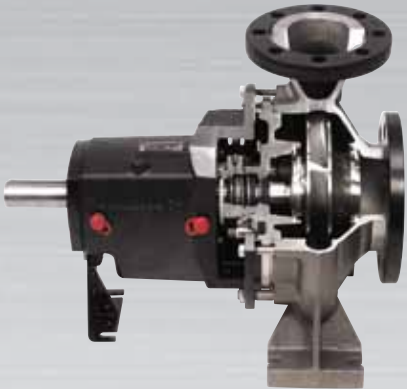


Shaft seals

Extreme liquids call for extreme measures. Most NBG/NKG pumps are used for watery liquids at temperatures below 120°C and pressures lower than 16 bar. When liquids go beyond these limits, special shaft seal solutions are required to guarantee reliable operation.

What follows is an overview of some of the most common shaft seal variants for the NBG/NKG range offered by Grundfos. However, the overview covers only a fragment of the total shaft seal range. Please do not hesitate to contact Grundfos if your requirements are not covered by the overview.

- Aggressive or corrosive liquids
- Abrasive liquids
- Poisonous and/or explosive liquids
- High-viscosity and/or sticky liquids
- Extraordinary high pressure
- Extraordinary high or low temperature



Solution	Description
Double shaft seal Back-to-back	For applications involving dangerous, flammable, or very abrasive liquids, a double shaft seal fitted back-to-back in a pressure chamber is available. The pressure in the chamber must be higher than the pump pressure to prevent leakage. The barrier fluid pressure can be supplied by either a Grundfos dosing pump arrangement (up to 16 bar) or an intensifier for pressure requirements up to 25 bar.
Double shaft seal Tandem	For applications involving a high risk of crystallisation (e.g. sugar solutions) or hardening (e.g. oil or paint) as well as pumps handling vacuum, special double shaft seals are available. Grundfos offers a quenching fluid system for flushing of shaft seals.
Double shaft seal Tandem or Back-to-back	For applications mentioned above a cartridge seal operating either as a tandem seal or as a back-to-back seal is also available.

Solution	Description
Shaft seal variants	Grundfos offers a wide range of balanced and unbalanced shaft seals, non-cartridge and cartridge seals. These include several seal face combinations that can handle almost any industrial liquid.
Rubber materials	Different combinations of O-rings in shaft seals and in the pump are possible in order to adapt to the specific application. Special rubber types such as FKM (Flouraz®), FFKM (Kalrez®), and HNBR are available where the liquid may damage standard O-ring materials such as EPDM, FKM and Viton®.
Stuffing box	The stuffing box is an alternative for remote applications where the mechanical shaft seal will quickly wear out. Three types are available: without cooling, with internal cooling from the pump, with external cooling.



Pump modules

All the made-to-stock NBG/NKG pump modules can handle the most demanding of liquids and pressures – and be adjustable to virtually any requirement. Of course, the modules can be combined in multiple ways making it possible for us to provide you with a pump solution that matches your specific needs. NBG/NKG pumps come in many flow sizes and various grades of corrosion-resistant stainless steel.

What follows is an overview of some of the most common NBG/NKG pump variants offered by Grundfos. However, the overview covers only a fragment of the total pump range. Please do not hesitate to contact Grundfos if your requirements are not covered by the overview.

- High inlet pressure
- High-pressure pump systems required (up to 25 bar)
- Pumping of gas or particle-entrained liquids
- Pumping of high-viscosity or sticky liquids
- Vertical pump mounting
- Reduced silicon content in pump
- Special materials required



Solution	Description	Photo
Housing material	NBG/NKG pump housings are available in three material variants – cast iron and two different stainless steel grades, covering everything from clean water to chemical applications.	
Impeller material	With the choice of cast iron, bronze or stainless steel impellers, the pump can be fully adapted to any pumped liquid. Optimised hydraulics of impeller and pump housing provide outstanding efficiencies.	
Wear ring material	The complete pump range is supplied with replaceable wear rings. The wear ring material is matched to the impeller to achieve best possible sealing and wear properties.	
Shaft material	To provide a very long life and good serviceability of the pump, the wetted part of the shaft is always in stainless steel. Three grades are available: 1.4034, 1.4401, 1.4462.	
Rubber materials	Different combinations of O-rings in the pump are possible in order to adapt to the specific application. Special rubber types such as FXM (Flouraz®), FFKM (Kalrez®), HNBR and FEPS are available where the liquid may damage standard O-ring materials such as EPDM, FKM and Viton®.	
Couplings	For NKG pumps two couplings are available: the standard coupling and the spacer coupling. The spacer coupling provides supreme serviceability.	

Solution	Description	Photo
High inlet pressure	For applications with extremely high inlet pressure, a heavy-duty bearing construction is necessary to counterhold the shaft.	
Flange connections	Flange connections are according to EN 1092-2 and AS (PN16). Most stainless steel pumps are available with loose flanges rated for 16, 25 or 40 bar.	
Bearing monitoring	Unexpected downtime for repairs usually causes major production losses. This can be avoided by having bearing monitoring devices installed in the bearing bracket. These give continuous information about the bearing condition so that repairs can be scheduled for an appropriate time. SPM (shock pulse measurement) fittings are fitted as standard in the heavy-duty bearing bracket. Fitting of Pt100 sensors is an option.	
Vertical mounting	Certain situations require the pumps to be mounted vertically. The NBG pumps can be designed to fit installations with limited width, vehicles, ships, etc.	
Bare shaft pump	For applications in remote areas or mobile applications where electric power is not available, bare pumps powered by e.g. diesel engine or steam turbine can be supplied.	
Silicon reduced pump	For applications where paint wetting impairment substances must not be present, a silicon reduced pump can be used. The silicon reduced pump is assembled using silicone-free components, lubrication, shaft seal, and O-rings. The product will be performance tested in the normal production test equipment.	



Other options

In addition to the range of variants relating to the motor, shaft seal, or pump module of the NBG/NKG products presented on the foregoing pages, Grundfos offers a variety of other customised solutions to suit almost any conceivable need or requirement that you may have. For instance a variety of certificates and approvals are available, as are pumps in special colours.

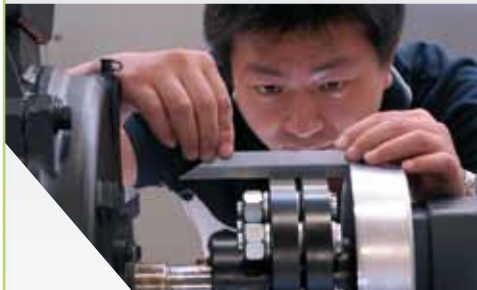
The following overview presents only a fraction of the many possibilities that we offer. Please do not hesitate to contact Grundfos if your requirements are not covered by the overview.

What you need. Guaranteed

It is more than likely that we will be able to create exactly the right pump for you by combining the elements and options already available within the NBG/NKG range. But if you have special requirements or a specific design in mind, let us know. We will do our best to provide full satisfaction.

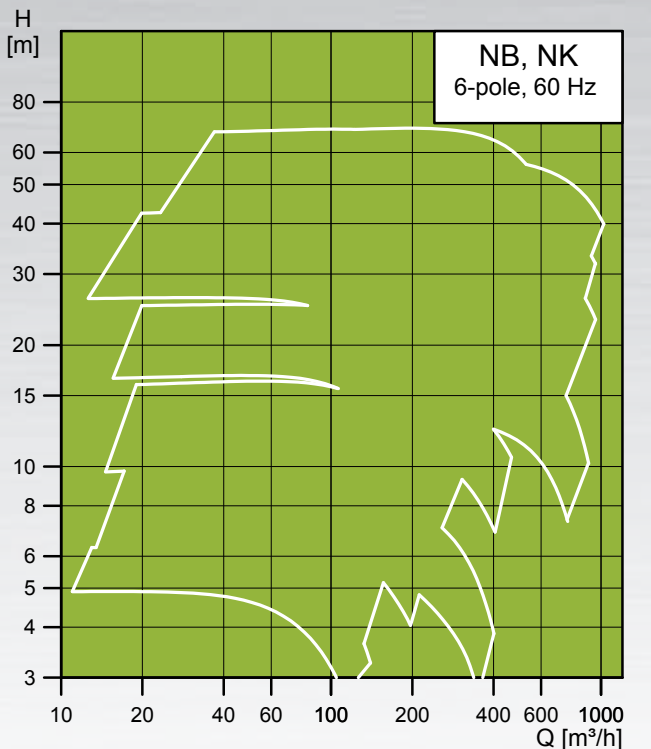
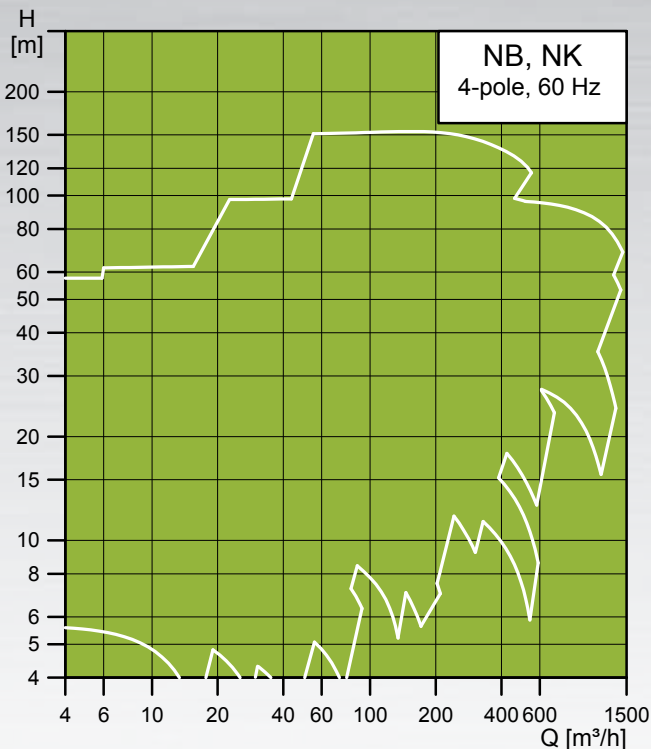
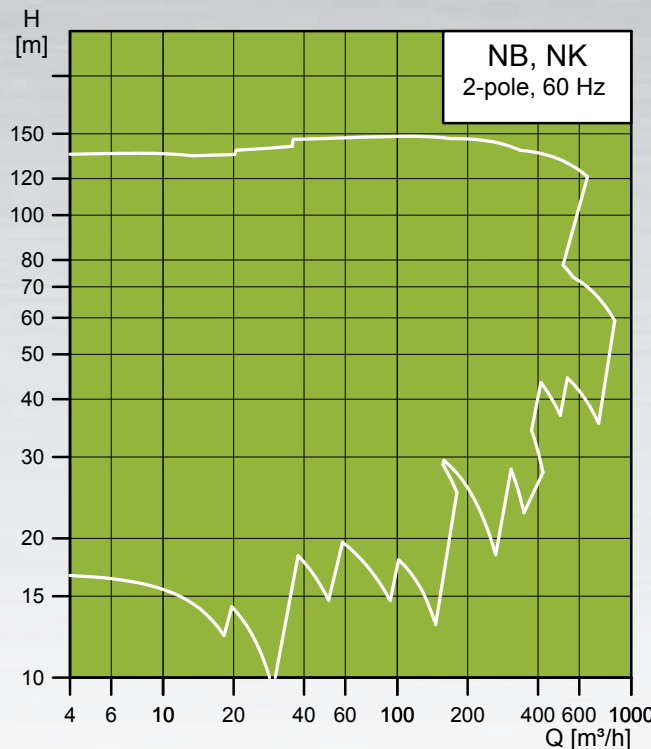
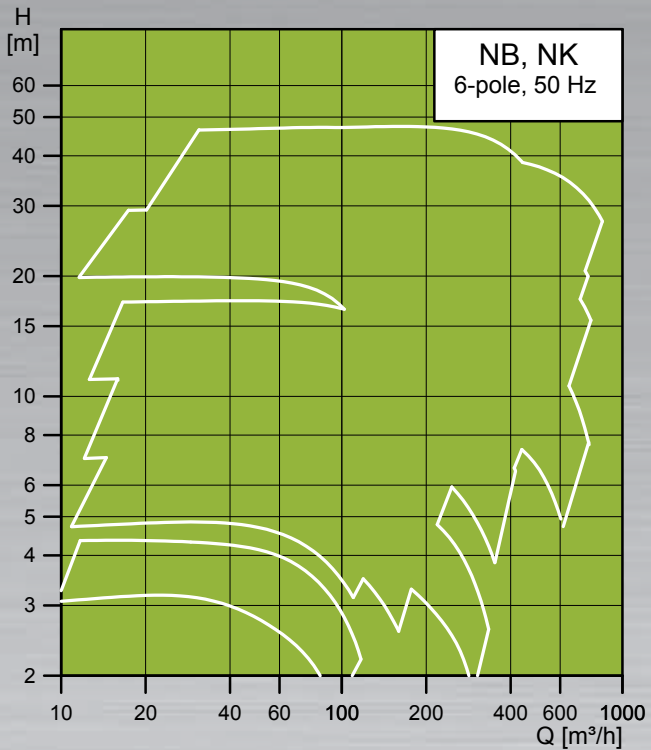
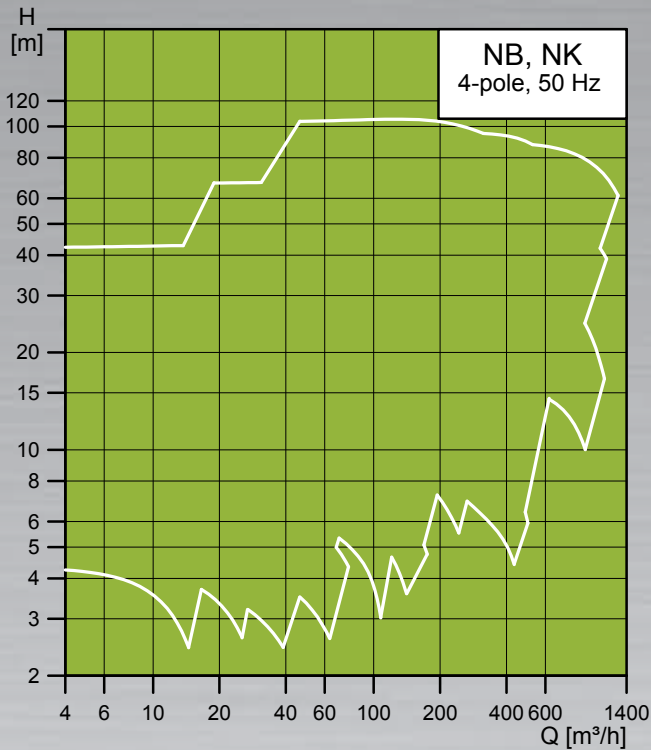
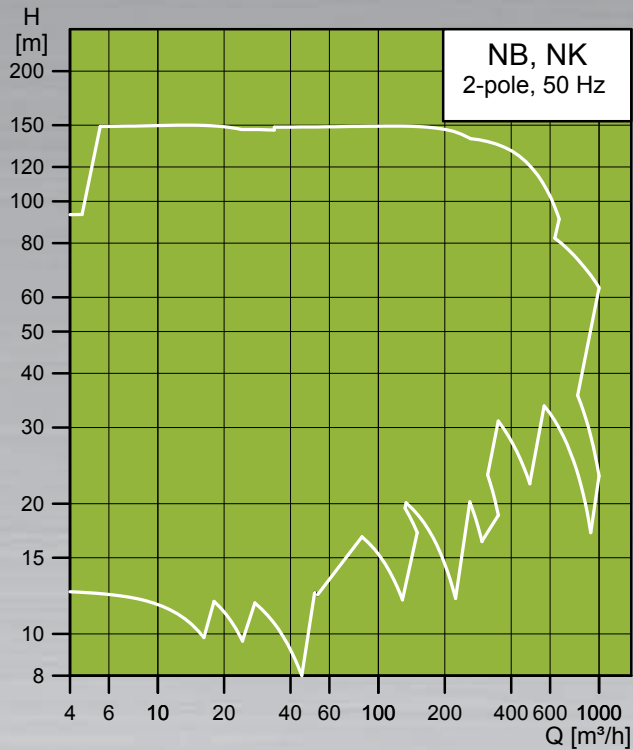
Great tools are just a mouse-click away!

Grundfos offers the market's most comprehensive, 24-hour, online access to everything you need to maintain or service your system: from CAD drawings to installation videos and operating instructions. Go to www.grundfos.com, choose the WebCAPS symbol, and you are there: detailed technical information, drawings, wiring diagrams, dimensioning – everything!

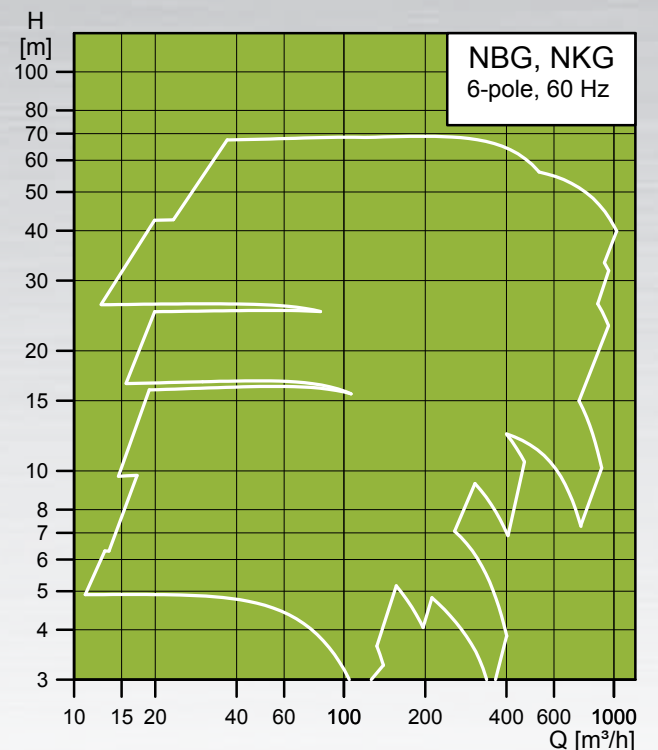
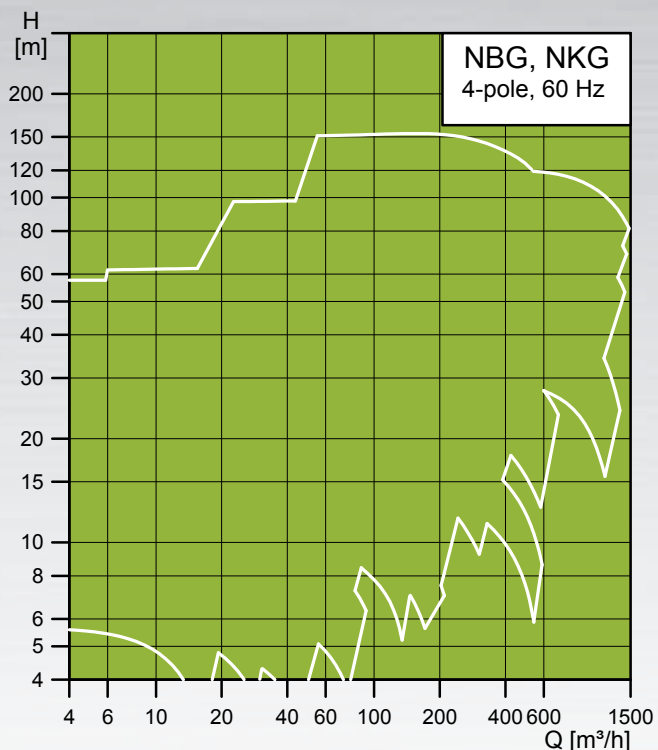
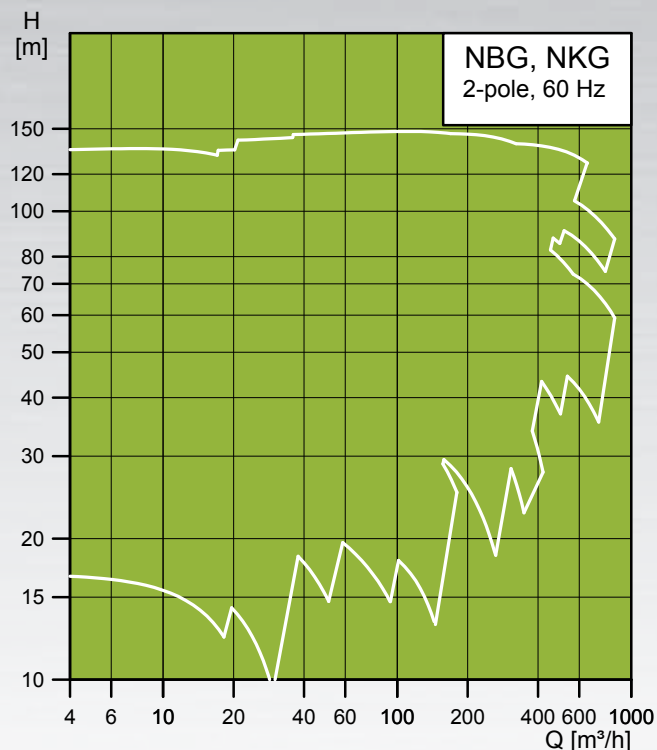
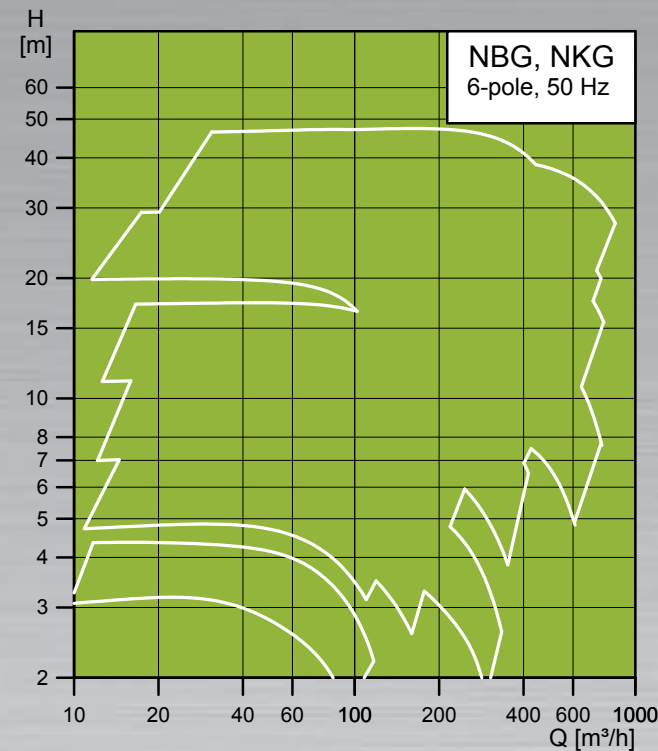
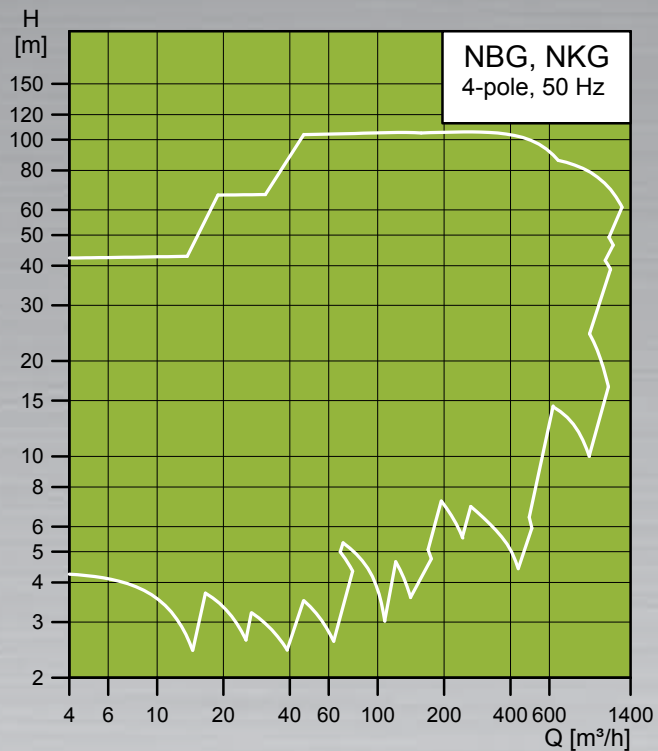
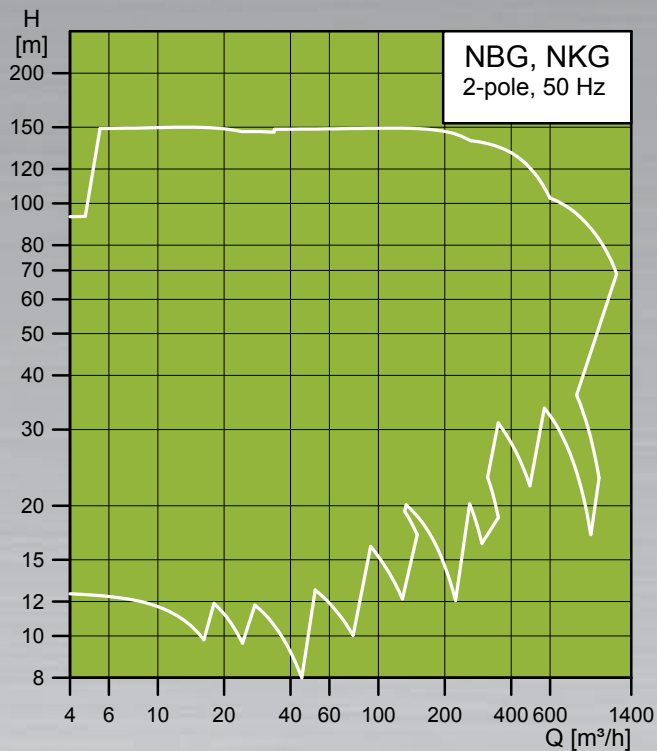


Solution	Description	Photo
Diesel drive	Alternative drive with diesel or other motor brands.	
NBG pumps with or without feet	All NBG pumps are available with housing feet. A smaller range of NBG pumps are available without feet for suspension to the pump flanges only.	
Duty point specific pump	A duty point specific is available for both bloc and norm pumps.	
Special colours	Pumps are available in a multitude of colours to match any requirement.	
Certificates and approvals	A wide range of pump and material certificates are available, e.g. inspection certificates Lloyds (LRS), Veritas (DNV), American (ABS), standard test report, ATEX certificate and much more.	
Pumps for bottle washing machines	Grundfos has a wide range of NBG pumps adapted specifically to bottle washing machines. This accounts for new projects as well as replacement pumps. The pump range for bottle washing machines includes pumps for suspension to the pump flanges only.	

Performance range NB/NK pumps according to EN 733



Performance range NBG/NKG pumps according to ISO 2858



36

“F=fixed flange
L=loose flange 2)”

“F=fixed flange
L=loose flange 2)”

37



PUMP AUDIT

- ✓ SAVED MONEY
- ✓ REDUCED CO₂

2/3 of all pumps installed today are inefficient and use up to 60% too much energy

When your existing pump pool is more than five years old, you will probably have big potential for saving money and CO₂ in your daily operation.

Save energy, save money

It is vital that pump systems are optimised to their full potential. Many pumps waste energy and by optimising or replacing them, huge reductions in CO₂ and operational costs can be achieved.

Grundfos Pump Audit

Take advantage of the Grundfos Pump Audit. It is a service concept that will, in just a few steps, furnish you with black and white facts about the efficiency of your pump process. The Pump Audit report will enable you to take further steps to optimise your pumps and operations.

Correctly sized, new pumps are more efficient, require longer service intervals and encounter less downtime. What's more, payback time is usually as little as six months to two years.

Expert team

The Grundfos Pump Audit team is ready to offer you a thorough investigation of your pump systems. Contact us for more information.



RECOMMENDATIONS



OPTIMISED PROCESSES

APPOINTMENT WITH
CONSULTANT

ON SITE INSPECTION

DIAGNOSIS

Customisation made easy

In order to meet all customer requirements with complete precision, Grundfos has developed a unique mix-and-match approach to customised pumps. The elements of the CR and NBC/NKG ranges can be combined any which way to create the solution that is exactly right for you.

Grundfos: a pump for every purpose

Grundfos offers much more. A complete range of pump solutions means that all applications – industrial and domestic – can benefit from the Grundfos touch.

- Heating
- Cooling
- Water Supply
- Wastewater
- Fire Fighting
- Dosing
- Industrial Processes

